R E M A R K S

I.   Status of the claims

Claims 36 – 41 are pending. Claim 36 has been amended in response to the rejection under 35 U.S.C. 103. The amendment to claim 36 is the result of a calculation related to the parts by weight of ethylene glycol and terephthalic acid. Claims 37 – 41 have been amended to correct the dependency. No new matter has been entered.

At the outset, even though the amendment is filed in response to a final rejection, this amendment is filed with a RCE, and therefore a showing under 37 CFR 1.116 is not required at this time.

II.   Summary of the Interview with the Examiner

Applicants are grateful to the Examiner for his time on October 17, 2006 to discuss the above-referenced application. During the interview, it was clarified that the Examiner's rejection was based on the abstracts of JP06166747 (JP 747) and IN 145323. Applicants provided the Examiner with a proposed amendment to claim 36 which emphasized the importance of the molar ratios. Applicants further pointed out that these ratios were not taught in either reference and especially in JP 747, wherein a translation of the applicable portions of JP 747 could be provided to the Examiner. The Examiner indicated that we should provide this translation and he would consider it when reviewing our amendment. Accordingly, a translation into English of the applicable paragraphs is attached hereto for consideration by the Examiner. No agreement was reached during the interview.

III.   Rejection of claims under 35 USC 103

The rejection of claims 36-41, under 35 USC 103(a) as being unpatentable over JP06166747 (JP 747) in view of IN 145323 is respectfully traversed. The Examiner alleges that JP 747 teaches polymerization of aromatic polyesters

comprising adding adding aromatic polyesters to a reaction system, and then depolymerizing at 200-250 °C to make a pre-decomposed product. The Examiner admits that JP 747 does not explicitly teach that aromatic dicarboxylate of JP 747 to be bis-β-hydroxyethyl terephthalate. The Examiner argues that it would have been obvious to modify JP 747, in view of IN 145323, to include a step of reacting the decomposed product with ethylene glycol to obtain the present invention.

In this regard, Applicants submit that a person skilled in the art would not have been led to the present invention, because there is no suggestion or motivation in either of the references to use a process which comprises "bis-ß-hydroxyethyl terephthalate and/or a low condensate thereof having a molar ratio of ethylene glycol to terephthalic acid between 10.6 and 40.5".

A.   Calculation and Explanation of Molar Ratios

The numbers contained in the ratio are calculated as follows:

i.   For 10.6

The calculation of the final content of ethylene glycol relative to the molar amount of terephthalic acid for the subject invention is derived as follows:

In the present invention, the amount of the glycol component will be the smallest when (a) 1 part by weight of an aromatic polyester is decomposed with 0.1 part by weight of bis-β-hydroxyethyl terephthalate and/or a low condensate thereof and then (b) 1 part by weight of the decomposed product is reacted with 3.0 parts by weight of ethylene glycol. From the above reaction (a) 1.1 parts by weight of the decomposed product is obtained. Since the molecular weight of PET is 192, the molecular weight of the glycol component (ethylene glycol component) is 44, and the molecular weight of BHT is 254, the molar ratio of the acid component to the glycol component for the above decomposed product is calculated as follows.

Acid component: glycol component = (acid component of PET + acid component of BHT):(glycol component of PET + glycol component of BHT) = (1/192+0.1/254):(1/192+0.1x2/254)

= (0.0052+0.0004):(0.0052+0.0008)

= 0.0056:0.0060

Because 1.1 parts by weight of the decomposed product is used in the reaction (b), ethylene glycol is used in an amount of 3.3 times the weight of the decomposed product. The molar ratio of the acid component to the glycol component in the reaction system (b) is obtained as follows.

Acid component: glycol component = 0.0056:(0.0060+3.3/62)

= 0.0056:0.0592

= 1:10.6

ii.   For 40.5

The case where the largest amount of the glycol component is employed is when (c) 1 part by weight of an aromatic polyester (PET) is preliminary decomposed with 4.5 parts by weight of bis-β-hydroxyethyl terephthalate (BHT) and then (d) 1 part by weight of the obtained pre-decomposed product is reacted with 10.0 parts by weight of ethylene glycol.

Reaction (c) yields 5.5 parts by weight of the pre-decomposed product. Because PET has a molecular weight of 192 and BET has a molecular weight of 254, the molar ratio of the acid component to the glycol component of the pre-decomposed product is as follows:

Acid component: glycol component = (acid component of PET + acid component of BHT):(glycol component of PET + glycol component of BHT)

= (1/192 + 4.5/254): (1/192+4.5 x 2/254)

$$= (0.0052 + 0.0177): (0.0052 + 0.0354)$$

$$= 0.0229: 0.0406$$

Because 5.5 parts by weight of the pre-decomposed product is used in reaction (d), 55 parts by weight of ethylene glycol is used. The molar ratio of the acid component to the glycol component in reaction (d) is as follows:

Acid component: glycol component

$$= 0.0229: (0.0406 + 62)$$

$$= 0.0229: 0.9277$$

$$= 1:40.5$$

Therefore, in a case where the largest amount of glycol component is used, the glycol component is 40.5 times the molar amount of the acid component.

Consequently, because the smallest amount of the glycol component is 10.6 times the molar amount of the acid component, the molar ratio of the acid component to the glycol component is 1:10.6 to 40.5.

B.   Rejection in view of JP 747 and IN 145323 (continued)

Turning back to the rejection itself, nowhere does either JP 747 alone or in combination with IN 145323 teach or suggest a molar ratio within the claimed range. Applicants point out that the Examiner has relied entirely on abstracts which are open to misinterpretation and do not support the Examiner's allegation. Neither of the abstracts contain a teaching or suggestion for using a molar ratio as claimed in the subject process. In fact, Applicants submit that JP 747 teaches away from using a ratio as herein claimed. It is respectfully pointed out that the Examiner must consider the prior art reference in their entirety and not only the abstract. MPEP 2141.02 ("VI. Prior art must be considered in its entirety, including disclosures that teach away from the claims").

In this regard, Applicants have provided the Examiner with translated portions of JP 747 to show that the abstract has been misinterpreted and that the prior art teaches away from the claimed ratio. JP747 teaches at paragraph [0018] that when the above molar ratio is higher than 5.0, not only is a unit of ethylene glycol and a unit of energy required for the removal of ethylene glycol during a polycondensation reaction but also the boiling point during the reaction drops, whereby the depolymerization reaction time is extended and the softening point of the regenerated PET lowers disadvantageously. Moreover, paragraphs [0030] and [0031] describe a situation when the molar ratio is too low or too high, whereby the process or product obtained is deficient. When the molar ratio is too low, the process is described as "unsatisfactory", and when the molar ratio is too high, a defective product was obtained. As an illustration, Comparative Example 4 in JP 747 teaches a ratio of 7.0, whereby the obtained product has a long depolymerization time, a low polycondensation reactivity (i.e., rise in intrinsic viscosity is slow) and a low softening point. Clearly, JP 747 shows bias against using a molar ratio as claimed in the present invention.

The Examiner's secondary reference IN 145323 does not help to remedy the defect of the teaching in JP 747. The combination as argued by the Examiner in his rejection is similar to Comparative Example 1 in paragraph [0028] of JP 747 which shows a combination of PET and ethylene glycol. There, the product obtained in Comparative Example 1 is "not so preferred" as the product is defective by having a long depolymerization time, for example. Therefore, it is believed that a combination of JP 747 and IN 145323 is negated by the fact that JP 747 does not favor the combination as argued by the Examiner. Applicants turn the Examiner's attention to the examples in the filed specification which show a process for producing bis-β-hydroxyethyl terephthalate and/or a low condensate thereof. The inventive process produces a product which overcomes the deficiencies of the prior art as evidenced by the Tables and the description of the obtained product.

For all of the above reasons, claims 36-41 are clearly patentable over JP 747 taken alone or in combination with IN 145323.

Reconsideration and allowance of claims 36-41 is respectfully solicited.

CONCLUSION

In view of the foregoing amendment to the claims and remarks, it is respectfully submitted that the instant invention as defined in claims 36 - 41 is in full compliance with all the statutory requirements of Title 35 USC, and, therefore, it is earnestly requested that the Examiner's rejection be withdrawn and that the pending claims be passed to issue.

Respectfully submitted
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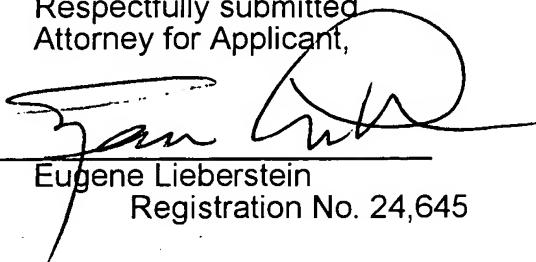
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Enclosure: Translated portions of JP 747

CERTIFICATE OF MAILING

I hereby certify that this *Amendment* is being deposited with the United States Postal Service via First Class Mail addressed to Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on October 31, 2006.

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_____ (Signature of person mailing paper or fee)

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(page 3, right column, lines 3 to 9)
[0018] When the molar ratio is higher than 5.0, not only
the unit of EG and the unit of energy required for the
removal of EG at the time of a polycondensation reaction
rise but also the molar ratio of the reaction system
increases when the BHT is stored BHT, whereby the
equilibrium boiling point of BHT becomes low, the
depolymerization reaction time becomes slow, and the
subsequent polycondensation reaction time also becomes slow.
Further, the softening point of PET to be regenerated
lowers disadvantageously.

(page 4, left column, lines 13 to right column, line 2)
[0026] Example 1
In Comparative Example 1, 100 parts of PET waste was added
to a reaction system in which 164.6 parts of BHT remaining
in a depolymerization can at 220°C was stored BHT.
Simultaneously with the addition of the PET waste, the
elevation of the temperature was started, and 64.6 parts of
EG (molar ratio of 2.0) was added after 15 minutes when the
temperature reached 235°C. The inside temperature of the
can after the addition of EG was 215°C. Thereafter,
heating was further continued and reached 220°C after 30
minutes. The polymer totally dissolved. The reaction was
further continued at 220°C for 15 minutes, and a
depolymerization reaction was completed. The total
depolymerization time was 1.0 hour.
[0027] After foreign matter contained in 164.6 parts of BHT

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(equivalent to 100 parts of PET) was separated by a disk type centrifugal separator like Comparative Example 1, a polycondensation reaction was carried out to obtain regenerated PET (Experiment No. 2). The number of batches was increased by utterly the same operation as in Experiment No. 2 to obtain regenerated PET (Experiment Nos. 3 to 5). The above depolymerization conditions (Experiment Nos. 2 to 5), depolymerization times and the polymer characteristic properties of the regenerated PET's are shown in Table 1.

[0028] Comparative Example 1

200 parts of PET waste and 129.2 parts of EG (EG/acid component molar ratio of 2.0) were fed to a depolymerization can equipped with a stirrer, heating coil and fractionating column, and heating was started. The total amount of distillating EG was refluxed to the depolymerization can from right after the start of heating except that the top of the refractioning column showed the boiling point of water. Since large amounts of the PET waste and unreacted EG were existent in the reaction system for a while after the start of heating, it took 2.0 hours to increase the temperature from 197°C which is the boiling point of EG to 200°C. Thereafter, heating was further carried out and 220°C was reached 4 hours after the start of heating. The polymer totally dissolved. The reaction was further continued at 220°C for 15 minutes, and a depolymerization reaction was completed. The total depolymerization time was 4 hours and 15 minutes. Thereafter, the depolymerization can was pressurized at 0.2 fkg/cm^2 with nitrogen, 164.6 parts (equivalent to 100 parts of PET) of BHT was supplied to a disk type centrifugal separator to separate foreign matter and transferred to a polycondensation reaction can, and a polycondensation reaction was completed in accordance with a commonly used method (Experiment No. 1). In this example, the polymer characteristics properties of the regenerated PET were not so preferred because its depolymerization time was long, its intrinsic viscosity was 0.625, its softening point was 259.3°C and its color b value was 6.2. The above depolymerization conditions (Experiment No. 1), the

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depolymerization time and the polymer characteristic
properties of the regenerated PET are shown in Table 1.

(page 4, right column, lines 15 to 29)
[0030] Examples 2 to 4, Comparative Examples 3 and 4
BHT which was subjected to a depolymerization reaction in
the same manner as in Experiment No.2 of Example 1 except
that The amount of EG added was changed and the molar ratio
at the time of a depolymerization reaction was changed was
supplied to a disk type centrifugal separator and then to a
polycondensation reaction can to complete a
polycondensation reaction (Experiment Nos. 7 to 11).
[0031] When the molar ratio fell below the range of the
present invention, the separation of foreign matter was
unsatisfactory (Comparative Example 3, Experiment No. 10).
When the molar ratio exceeded the range of the present
invention, a polymer having a long depolymerization time,
low polycondensation reactivity (rise in intrinsic
viscosity was slow) and a low softening point was obtained
(Comparative Example 4, Experiment No. 11).
[0032] The above depolymerization conditions (Experiment
Nos. 7 to 11), the depolymerization times and the polymer
characteristic properties of the regenerated PET's are
shown in Tables 2 and 3.

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(page 5)

Table 1

Experiment No.			C.Example 1	Example 1			
			1	2	3	4	5
Depolymerization conditions	Stored BHT	Molar ratio of EG (-)	-	2.0	2.0	2.0	2.0
		Temperature (°C)	-	220	220	220	220
	Depolymerization temperature after addition of PET (°C)		-	235	235	235	235
	Conditions after addition of EG	Molar ratio of EG (-)	-	2.0	2.0	2.0	2.0
		Depolymerization temperature (°C)	220	220	220	220	220
	Depolymerization time		4:15	1:00	1:02	1:02	0:58
Polymer characteristic properties of regenerated PET	Intrinsic viscosity(-)		0.625	0.623	0.624	0.625	0.622
	Softening point(°C)		259.3	259.7	259.8	259.9	259.8
	Color b value(-)		6.2	5.4	5.2	5.3	5.3
	Number of foreign substances(number/50g)		0	0	1	0	1
Remarks			not stored	first batch	fifth batch	10-th batch	30-th batch

C.Example: Comparative Example

(page 7)

Table 3

Experiment No.			Comparative Example 3 10	Comparative Example 4 11
Depolymerization conditions	Stored BHT	Molar ratio of EG (-)	2.0	2.0
		Temperature (°C)	220	220
	Depolymerization temperature after addition of PET (°C)		235	235
	Conditions after addition of EG	Molar ratio of EG (-)	0.3	7.0
		Depolymerization temperature (°C)	220	203
	Depolymerization time		1:00	1:58
Polymer characteristic properties of regenerated PET	Intrinsic viscosity(-)		0.636	0.600
	Softening point(°C)		259.7	258.5
	Color b value(-)		5.2	5.5
	Number of foreign substances(number/50g)		29	0